BOOK REVIEW

K. Hausmann, N. Hülsmann, R. Radek: Protistology. 3rd completely revised edition. *E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u. Obermiller)*, *Berlin*, *Stuttgart*, *2003. ISBN 3–510–65208–8*, *hardback*, *379 pp. Price EUR 64.00.*

There have been only a few protozoological textbooks which were good enough to enjoy repeated editions – e.g., the classical Doflein-Reichenow voluminous and comprehensive textbook (6 editions), Kudo's textbook (6 editions) and Grell's monograph (3 editions). This elite club has been now entered by Protistology of Klaus Hausmann and two other illustrious German protozoologists from the Free University of Berlin, with three other chapter contributors. The first 1985 German edition "Protozoologie" written by K. Hausmann was followed by the English edition of "Protozoology" (1996) co-authored with Norbert Hülsmann. The present edition prepared with Renate Radek as the third co-author reflects the enormous progress achieved in the research of single-celled organisms in the recent years and thus had to be revised to a large extent.

The greatest change is that the book deals with all eukaryotic unicellular organisms, i.e., in addition to "true" protozoa also with all other with basically protistan level of organisation, thus also encompassing those which have been conventionally assigned to protophytes or fungi. That is why the title has been changed to "Protistology". Accordingly, the number of organisms included has considerably increased, necessitating some economical measures in the size of illustrations and layout of the book. This did not affect at all, however, the aesthetically pleasing look of the book, edited with great care.

The book is clearly organised in several parts. The first part is the "Introduction and overview", offering history of nomenclature and protistological research —this is a very useful text, dealing with facts hardly to be found anywhere else— and describing the cell organisation of protists. The second part is on "Evolution and taxonomy": it deals with the origin of eukaryotic cell and explains, among other things, primary, secondary and tertiary endosymbioses. The gradual development of classification systems is briefly outlined and some of the recent, sometimes controversial systems of protists are introduced. This part then continues with systematic treatment of all protistan groups. The third part deals with topics of general protistology.

While chapters on general protistology topics have been revised only to some extent, the taxonomic part was razed to the ground compared to the previous edition. The authors obviously took into account several recent classifications including those of Cavalier-Smith, but at variance with this author they no more recognise Protozoa as a separate kingdom, stressing that Protozoa do not represent an evolutionary lineage in the phylogenetic sense. The authors do not accept the existence of separate eukaryotic kingdoms; they subdivide the only empire Eukaryota into 12 phyla, to which they add eukaryotes *incertae sedis* like Acantharea, Heliozoa and Paramyxea. At the same level of phylum are e.g., Tetramastigota, Foraminifera and Opisthoconta, the latter including the subphyla Fungi and Choanozoa; the subphylum Choanozoa contains the infraphylum Metazoa. The viewpoint which led the authors to use their very unorthodox, very novel high-level classification is evidently based on phylogenetic relationships as indicated by molecular analysis. They do not offer, however, a detailed explanation of guidelines on which their system has been constructed. They follow to a great extent the phylogram of eukaryotes published by Baldauf et al. in Science (2002), which in the book precedes the taxonomic part.

Following the new "protistan" conception of the book, it may now quite naturally embrace groups like diatoms, hypochytriomycotes, oomycetes (which feature *Saprolegnia* or *Phytophthora infestans*), red algae, algae belonging to green plants (in this group finds now its place the curious organism *Helicosporidium parasiticum*), fungal groups such as Microspora and also Ascomycota with *Pneumocystis carinii* and *Candida*. The relatively new, phylogenetically important group Ichthyosporea (here listed as Mesomycetozoa) with *Dermocystidium* and *Psorospermium* has been assigned to the subphylum Choanozoa. Myxozoa, assigned to metazoan infraphylum, are traditionally kept among protists, although as a whole they clearly exceed the protistan level.

In each of the protistan groups, its characteristics is followed by a detailed account of morphology and life cycles and for some groups, phylograms are presented. The clearness of presentation is facilitated by a choice of perfect line drawings and light and electron micrographs; this is what makes the book a desirable item for the library of every biologist. In each group there is a short list of names of representative genera; compared with the previous edition, more emphasis is placed on parasitic organisms. Only some of the important genera or species, like *Trichomonas*, *Plasmodium*, *Toxoplasma gondii*, *Candida albicans* and the like, are dealt with in more detail.

The third part presents "Selected topics of general protistology". The first of them is "Comparative morphology and physiology of protists". This is a marvellous account of special cell organelles and their function in protists; it shows the amazing diversity of structures developed to cope with a variety of problems which the unicells meet in their life. Biochemistry is not paid special attention to except for the mechanism of ciliary movement, digestion cycle of *Paramecium* and energy metabolism of amitochondriate protistan parasites. This falls in line with the prevailing taxonomical and morphological orientation of the book. The chapters "Nuclei and sexual reproduction" (contributed by Maria Mulisch) and "Morphogenesis and reproduction" (M. Mulisch), also accompanied by fine illustrations, explain the basic facts and also intimate how much there is still to be done in these fields of research. "Molecular biology" (contributed by Günther Steinbrück) presents a choice of basic problems such as e.g., editing, surface glycoproteins and telomeres in ciliates. In the new edition it has been extended to comprise a sequence on protistan proteomics mentioning the array of newly discovered tubulin families. "Behaviour of protists" (contributed by Hans Machemer) may be of interest for animal physiologists, too. "Ecology of protists" also includes a well-written part on protists as symbionts.

The book is concluded by a glossary of protistological terms, by a very helpful bibliography of essential books and publications, also including the list of important protistological journals.

Considering the large scope of the book, there are just a few inaccuracies or omissions; e.g., Ichthyosporea Cavalier-Smith, 1998 has priority over Mesomycetozoa Herr et al., 1999; *Buddenbrockia*, the ancestral form of Myxozoa is not mentioned; the myxosporean *Sphaerosoma* should read *Sphaerospora* (*Sphaerosoma* is both an ichthyosporean and a beetle); there is no valid species *Trichodina cyprinis*; *Blastocystis* is not listed in the book; the relation of *Cryptosporidium* to gregarines, as revealed by molecular analysis, is not pointed out; *Sarcocystis equicanis* is the junior synonym of *S. bertrami*, and *S. ovifelis* is the junior synonym of *S. gigantea*; while Haplospora is quoted as subphylum on p. 124, it is mentioned as phylum on p. 127; rosette agent has been now given a name, *Sphaerothecum destruens*.

The effort to keep the volume within a reasonable size precludes the possibility of presenting descriptions of a large number of genera and species. However, people interested in particular groups or problems will easily find references for further study in the bibliography at the end. This volume presents a modern treatment of a large assemblage of organisms, which is now in the course of being reshaped and attracts increased interest. The book is written in a way which may stimulate people to engage in the study of protists. As it deals with basal facts at an up-to-date level, it is a beneficial reading for those interested both in free-living and in parasitic protists. It may be recommended as an invaluable source of information for protozoologists, parasitologists, biologists and biology students, and also for those loving beautiful forms of nature.

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